

REMARKS

The Office Action dated April 6, 2011, has been received and carefully noted. The above amendments and the following remarks are being submitted as a full and complete response thereto.

Claims 8-18 are rejected, claim 8 is objected to and claims 1-7 are withdrawn, and claim 8 is amended. Thus, claims 8-18 are pending in this application. Support for the amendments may be found in the specification as originally filed such as the original claims. Applicants submit that no new matter is added. Applicants respectfully request reconsideration and withdrawal of the rejections.

Request for Reconsideration

Applicants submit that in view of the amendments to the claims presented above, and the remarks set forth below, the outstanding rejections have been overcome. Applicants respectfully request that the Examiner reconsider and withdraw the rejections, and provide an indication of allowable subject matter. If anything further is believed needed to place this application in condition for allowance, the Examiner is requested to contact Applicants' undersigned representative for an interview.

Objections

Claim 8 is objected to for informality. In particular, the Office Action states that claim 8 should recite "a gas containing a nitrogen component." Claim 8 is amended as

suggested in the Office Action. Accordingly, Applicants respectfully request withdrawal of the objection to Claim 8.

Claim Rejections – 35 U.S.C. §112

Claims 8-18 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Office Action states that claim 8 includes that the reactive vessel is "capable of performing vacuum pumping" in the preamble. The Office Action also states that claim 8 should recite a "reaction vessel" instead of a "reactive vessel."

Claim 8 is amended in a manner believed to be fully responsive to the rejection. Applicants respectfully request withdrawal of the §112 rejection of Claims 8-18.

Claim Rejections – 35 U.S.C. §103

Claims 8-18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yamoto (U.S. Patent Publication No. 2002/0104477, hereinafter "Yamoto") in view of Wang (U.S. Patent Publication No. 2004/0121085, hereinafter "Wang"), and alternatively further in view of Matsuda (U.S. Patent No. 5,808,316, hereinafter "Matsuda"). Applicants respectfully traverse this rejection.

Claim 8 recites a method for forming a laminated thin SiN film on a substrate comprising, among other features, an activating step of generating active species by bringing a thin-film-component gas containing silicon, a gas containing a nitrogen component, and a hydrogen gas into contact with the exothermic catalyst body, thereby

generating active species of the gases; ***a surface treating step of surface-treating the thin film for each unit layer by the hydrogen gas active species; and another surface treating step of surface-treating the thin film for each unit layer by the active species of the gas containing the nitrogen component.*** Applicants respectfully submit that Yamoto, Wang, and Matsuda, alone or in combination, do not teach, suggest, or render obvious all of the features recited by claim 8.

The Office Action cites Yamoto for teaching a film forming step of forming a SiN film using a catalyst body. The Office Action admits that Yamoto does not teach forming a laminated film of multiple layers or surface treating each layer with treatment steps including hydrogen active gases and active species of the gas containing a nitrogen component. In order to cure the admitted deficiency, the Office Action cites Wang. The Office Action alleges that Wang teaches separate treatment steps of treating with a hydrogen gas active species and an active species of the gas containing a nitrogen component at paragraph [0033]. The Office Action further alleges that Wang teaches the separate steps in view of paragraphs [0025] and [0028]. Applicants respectfully submit that the Wang does not teach separate active species treatment steps.

Paragraph [0033] of Wang states:

In an embodiment of the present invention, the hydrogen radicals are formed by a "hot wire" or catalytic decomposition of a hydrogen containing gas, such as ammonia (NH₃) and hydrogen gas (H₂) ***or*** combinations thereof. In a "hot wire" process, a wire or catalyst, such as a tungsten filament is heated to a high temperature of approximately 1600-1800°C and the hydrogen treatment gas fed over the filament. The heated filament causes the cracking or decomposition of the hydrogen treatment gas to

form the hydrogen radicals. ***The hydrogen radicals*** then treat a silicon nitride film formed on a substrate located beneath filament. Although the filament has a high temperature, the substrate is still heated only to a low temperature of less than 600°C and preferably to less than 550°C during the treatment process. In yet another embodiment of the present invention, an inductive generated plasma may be utilized to generate the hydrogen radicals. (Emphasis Added).

Paragraph [0033] makes clear that the activated gas is a hydrogen containing gas. Examples of the gas may be ammonia, hydrogen, or the combination of ammonia and hydrogen. This unambiguous teaching says nothing about multiple steps of treatment where ammonia and hydrogen are used separately. The plain meaning of an “or” statement is that the listed elements are alternatives to each other. This reading is further supported by the remaining part of the paragraph which, as emphasized above, states that “the hydrogen radicals then treat . . .” Clearly, the intent of the disclosed treatment step is to treat with hydrogen radicals. Wang is merely listing several gases that may be used to provide hydrogen radicals for the single treatment step.

Applicants also respectfully submit that paragraphs [0025] and [0028] do not provide any weight to the Office Action’s interpretation. Paragraph [0025] merely states that NH₃ may be provided into the chamber as part as the forming of the silicon nitride film. Paragraph [0038] merely discusses the step 210 of treating the substrate with nitrogen source gas to terminate unreacted silicon sites on the substrate. There is absolutely no indication in either of these paragraphs that the nitrogen source gas is activated as part of a radical treatment step. This is further made clear by Figure 2, which lists the steps of the deposition. In particular, Applicants note that the gas

containing nitrogen is either part of the forming of the silicon nitride film (208) or is the unactivated treatment step (210). Both of these steps are tied to the deposition process (see dotted block 201). After the deposition there is clearly only a single step of treating with active species and only with active species of hydrogen (212). Therefore, Applicants respectfully submit that, taken as a whole, Wang does not teach or suggest two separate active gas species treatment steps as recited by claim 8.

Matsuda is cited merely for teaching that silicon films may be formed using silane gases such as SiH_4 or chlorine containing silane gases. Thus, Matsuda does not cure the above-described deficiency of Yamoto.

In view of the above, the Applicants respectfully submit that none of Yamato, Wang, and Matsuda, nor any combination thereof, teach, suggest, or render obvious at least the combination of features recited by amended Claim 8.

Claims 9-18 depend directly or indirectly from Claim 8. The Applicants respectfully submit that these dependent claims are allowable at least for the same reason Claim 8 is allowable, as well as for the additional subject matter recited therein.


For at least the above reasons, Applicants respectfully request reconsideration and withdrawal of the rejection of Claims 8-18 under 35 U.S.C. §103(a) over Yamoto, Wang, and Matsuda.

Conclusion

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event that this paper is not being timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to Counsel's Deposit Account Number 01-2300, referencing Docket Number 029567-00011.

Respectfully submitted,


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